PROJECT NUMBER: 1810
PROJECT TITLE: ART Process Development
PROJECT LEADER: R. Prasad
PERIOD COVERED: May, 1990

I. PROJECT ART - COMMERCIAL PLANT SUPPORT

A. **Objective:** To support the Bermuda Hundred Processing Facility startup/operation.

B. **Results:** This part of the program has been completed. The 12 Billion cigarettes/year capacity target is within reach with the cumulative effect of several changes in the cycle. The remaining items for commercial plant support are to transmit the backup distributor plate design to the plant personnel and to provide technical support during installation/startup of the CD monitor.

C. **Plans:** Complete the remaining items as per above.

II. PROJECT ART - BERMUDA HUNDRED PILOT PLANT

A. **Objective:** To support the commercial plant design and flavor development objectives at the Bermuda Hundred Pilot Plant.

B. **Results:**

Liquid Absorber Process - The commercial simulation trial of the countercurrent staging concept was completed with a total of 11 back-to-back extraction runs. Three stages with 20 gallons each of 6% CA/MPC solution (starting pH=3) were used for each run. As expected, the nicotine levels on each stage increased somewhat as the process lined out but had no adverse effect on absorption efficiency. The tobacco from these runs has been made into cigarettes by Flavor Development and is currently being smoked to determine the subjective impact of this mode of operation.

The pilot plant completed a series of runs designed to investigate the causes of batch-to-batch variations in extracted filler nicotine levels. A more extensive method was implemented for profiling the extracted filler bed for nicotine. The results show that the final nicotine level varied from about 0.06% at the bottom of the filler bed to about 0.15% at the top for standard liquid absorber process

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conditions (200 M/M). This variability within the tobacco bed has been responsible for much of the apparent batch-to-batch variation. This variation within the extracted filler bed occurs with stem as the absorbent as well, so it is strictly an extraction, rather than absorption, phenomena. Increasing the extraction time to 250 M/M reduces the variation to 0.06% - 0.09% throughout the filler bed. Additional extraction tests are currently in progress to fully characterize the nicotine distribution as a function of M/M.

C. **Plans:** Repeat the countercurrent staging series to confirm any flavor advantages.

III. PROJECT ART - NEW PROCESS DEVELOPMENT

A. **Objective:** To develop new processes for scale-up and implementation in the Bermuda Hundred Facility.

B. **Results:**

Liquid Absorber Nicotine Separation - Tests were conducted by Chemical Research on selective separation of nicotine from the liquid absorber effluent, with the objective of retaining flavor compounds while removing the nicotine. Reverse-phase separation fractions were generated using both C-18 silica gel and XAD-4 absorbents. The recovered neutral fractions were applied to extracted filler at two levels, representing 70 percent and 100 percent recovery. The resulting batches of filler were provided to Flavor Development for evaluation against control extracted product.

Liquid Absorber Effluent Disposal - Degradation of nicotine through conventional biological waste water treatment remains a promising method of disposal. The improved laboratory simulations of nicotine elimination through this method have been completed, and reviewed with Park 500 management. Further work will be conducted to evaluate biological pre-treatment of the liquid column effluent for nicotine destruction, prior to discharge into the waste water system.

C. **Plans:** Continue new process development via optimization of 1)absorber operation, 2)flavor separation, and 3)nicotine disposal steps.

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